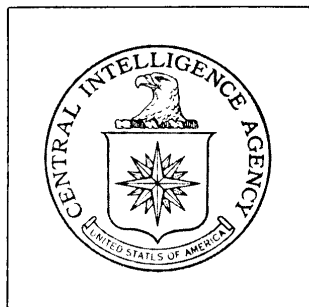


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**Industrial Facilities
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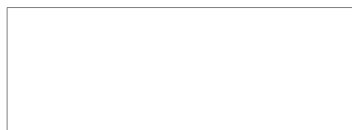
Basic Imagery Interpretation Report

Nadvornaya Petroleum Refinery

Nadvornaya, USSR



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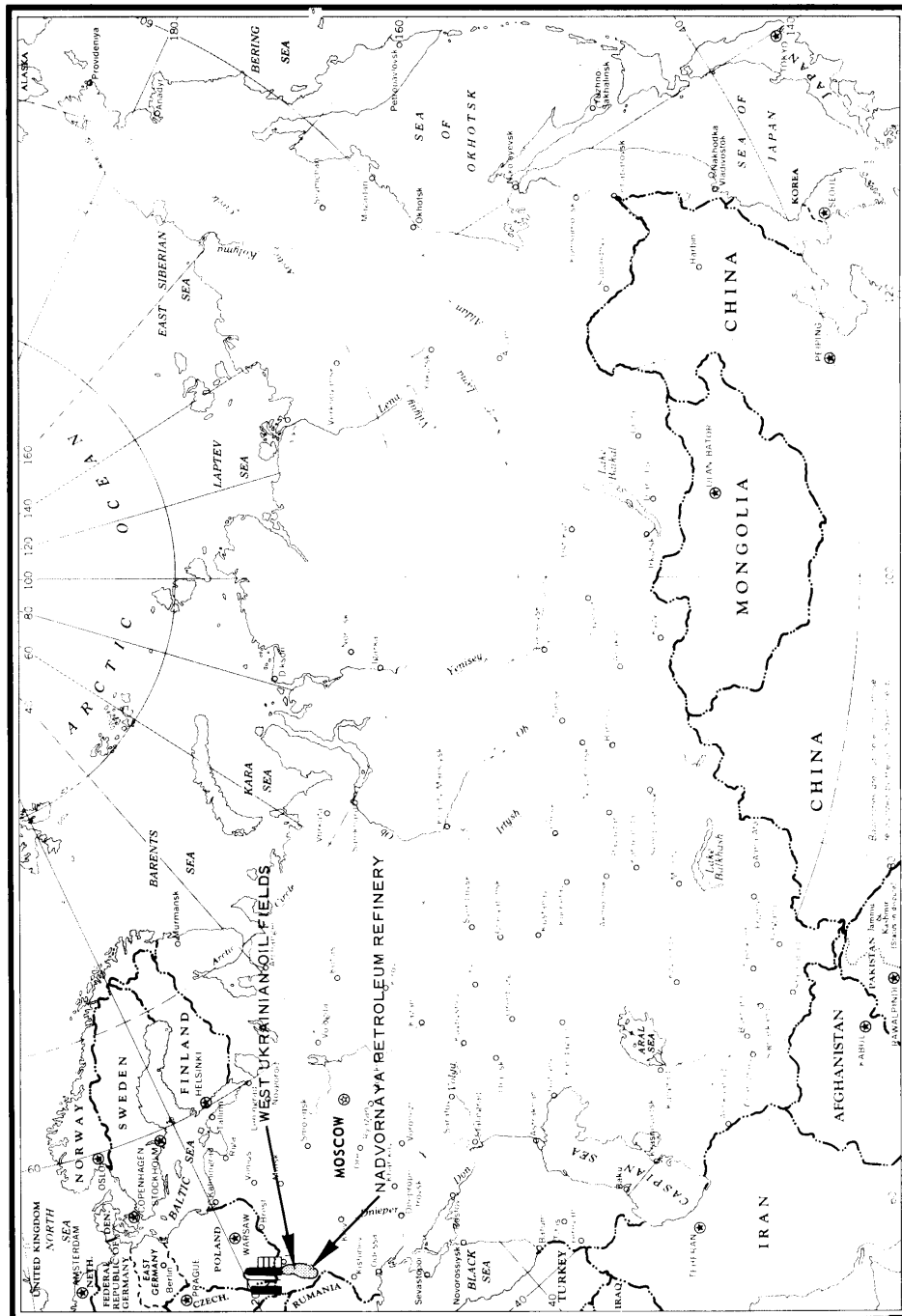


FIGURE 1. LOCATION MAP.

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INTRODUCTION

The Nadvornaya Petroleum Refinery is the newer and larger of two refineries located along the southeast edge of Nadvornaya in the Ukrainian SSR (see Figures 1 and 2). It has a very limited crude oil distillation capacity and is small in comparison to the other major Soviet refineries.

The older refinery is located about 1,200 feet to the southwest at 48-37-25N 024-34-50E. It was reportedly in operation in the 1930s, before the USSR annexed the area from Poland. 1/

Crude oil for charging the refineries is produced locally in the West Ukrainian oil fields. 2/ The crude oil is brought in and products are shipped out by truck and rail. Rail service is provided by a rail line between Delyatin and Kryplin.

Electric power is supplied through a transformer substation which is located outside the southeast corner of the refinery area. Sewage treatment facilities are located within the secured refinery area.

BASIC DESCRIPTION

Physical Features

The refinery occupies an irregularly shaped area which measures approximately 4,100 by 4,900 feet and contains about 345 acres. In general, the processing units are of standardized Soviet design and are widely spaced. The refinery is secured by a combination of walls and fences (see Figures 2 and 3).

The older refinery is in an irregularly shaped area about 1,750 by 1,900 feet which contains about 45 acres. It is secured by walls and fences. In the processing area of the older refinery, equipment and buildings are closely spaced and present a cluttered appearance which is characteristic of many old refineries.

Operational Functions

The major processing units presently constructed and in operation at this refinery include a crude oil distillation unit, a thermal cracking unit, a delayed coking unit, and a probable catalytic reforming-hydrotreating (CR-HT) unit. There is also an unidentified processing facility which possibly processes paraffins or waxes, and a sulfuric acid and chemical plant which possibly produces synthetic fatty acids or detergents.

The products of this refinery include straight-run, cracked and blended gasolines, kerosene, diesel and fuel oils, petroleum coke, possibly waxes, and sulfuric acid and other chemical products.

The only major refining equipment identified at the older refinery is for crude oil distillation, indicating that its products are limited to straight-run gasoline, kerosene, and heating oils. Distillation fractions from this older refinery are probably sent to the newer refinery for additional refining. Although no above ground pipeline connection is observed between the two refineries, products may be transferred by truck or underground pipeline.

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Table 1. Equipment and Facilities at the
Nadvornaya Petroleum Refinery
(Keyed to Figure 3)

| <u>Area</u> | <u>Functional Description</u> | <u>Equipment and Facilities</u> |
|-------------|---|---|
| A | Crude Oil and Products Receiving, Shipping, and Storage | 9 Control, pump and support buildings 2 Rail car loading racks 43 Cylindrical storage tanks 2 24-meter-diameter 6 [redacted] 25X1 1 [redacted] 10 18-meter-diameter 14 15-meter-diameter 2 12-meter-diameter 3 [redacted] 25X1 5 [redacted] 3 Horizontal storage tanks 2 [redacted] 25X1 1 15-meter-long 3 Water storage basins |
| B | Sewage Treatment | Facilities shown in Figure 3, but not enumerated |
| C | Steam Plant and Water Treatment | 1 Boilerhouse 1 Water treating building with 6 treating/storage tanks (not measured) 1 Small control building with 6 small probable chemical storage tanks (not measured) 10 Miscellaneous processing/ control/support buildings 4 Small construction support buildings 1 Natural-draft cooling tower 1 Cascade-type cooling tower 1 Cooling tower U/C 8 Cylindrical storage tanks 2 6-meter-diameter 4 [redacted] 25X1 4 Cylindrical storage tanks U/C 2 Semiburied storage tanks (not measured) 1 Semiburied storage tank U/C 7 Water storage/cooling/ treating reservoirs and basins |
| D | Administration and Support | 10 Administration and support buildings 1 Swimming pool and building 1 Building U/C 1 Water tower |

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| <u>Area</u> | <u>Functional Description</u> | <u>Equipment and Facilities</u> |
|-------------|--|--|
| E | Unidentified Processing | <ul style="list-style-type: none"> 1 Processing building with attached possible loading facility 1 Processing building with attached cluster of equipment 1 Processing building with 4 processing/storage drums 1 Processing building with 4 small treating/storage tanks and 1 drum 1 Processing building with 1 treating tank and 1 drum 1 Processing building with 1 associated treating/storage drum 1 Processing building with 4 associated storage/treating drums 11 Storage and support buildings 1 Possible treating/processing area U/C with 4 possible treating columns 1 Building U/C 14 Cylindrical storage tanks <ul style="list-style-type: none"> 4 12-meter-diameter 5 9-meter-diameter 2 25X1 3 6 Horizontal storage tanks, 12 meters long |
| F | Blending, Treating, and Shipping | <ul style="list-style-type: none"> 1 Blending and treating building with 6 associated blending/storage tanks 1 Probable processing column 8 Mixing/storage tanks, 3 meters in diameter 7 Miscellaneous buildings 8 Cylindrical storage tanks <ul style="list-style-type: none"> 5 12-meter-diameter 1 6-meter-diameter 2 3-meter-diameter 1 Cylindrical storage tank U/C 3 Horizontal treating/settling/storage tanks (not measured) |
| G | Sulfuric Acid and Chemical (possible synthetic fatty acid/detergent) Plant | Facilities shown on Figure 3, but not enumerated |

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| <u>Area</u> | <u>Functional Description</u> | <u>Equipment and Facilities</u> |
|-------------|-------------------------------|---|
| H | Delayed Coking | <ul style="list-style-type: none"> 1 Delayed coking unit with 2 coking drums, 1 coke storage pit and conveyor system, and 1 rail-served shipping building 1 Row of 6 columns (fractionators, stabilizers and stripping columns) 1 Pipe furnace 1 Pump building with 10 condensers/accumulators on roof 5 Support buildings 3 Cooling towers <ul style="list-style-type: none"> 1 4-cell 1 3-cell 1 2-cell 8 Cylindrical storage tanks <ul style="list-style-type: none"> 2 12-meter-diameter 3 6-meter-diameter 3 3-meter-diameter 3 Horizontal storage tanks <ul style="list-style-type: none"> 1 12-meter-long 2 6-meter-long 1 Semiburied storage tank (not measured) 3 Water storage reservoirs |
| I | Crude Oil Distillation | <ul style="list-style-type: none"> 1 Distillation unit with a row of 4 columns (2 atmospheric, 1 vacuum and 1 stripping/stabilizing columns), 2 banks of heat exchangers, 2 pipe furnaces, 1 probable chemical treatment building with 4 treating drums, 1 pump building, a desalting section with 1 building and 5 horizontal desalting drums, and 6 miscellaneous buildings 19 Cylindrical storage tanks <ul style="list-style-type: none"> 1 18-meter-diameter 4 12-meter-diameter 6 6-meter-diameter 3 3-meter-diameter 6 Horizontal storage tanks <ul style="list-style-type: none"> 4 15-meter-long 2 12-meter-long |

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| <u>Area</u> | <u>Functional Description</u> | <u>Equipment and Facilities</u> |
|-------------|--|--|
| J | Thermal Cracking | <ul style="list-style-type: none"> 1 Row of 5 columns (2 reactors, 1 fractionator, 1 flasher and 1 separator/ stripping column) 2 Probable drying columns 1 Bank of heat exchangers 1 Air cooler 1 Vapor recovery section with 2 columns and 1 process building 2 Pipe furnaces 1 Pump building 1 Support building with attached horizontal drum 10 Cylindrical storage tanks <ul style="list-style-type: none"> 2 15-meter-diameter 4 6-meter-diameter 3 Horizontal storage tanks, 12 meters long |
| K | Probable Catalytic Reforming-Hydrotreating | <ul style="list-style-type: none"> 1 Probable catalytic reforming section with 4 reactors, a row of 3 columns, 1 process building with 1 column through roof, 1 bank of heat exchangers, 1 furnace, 3 pump/compressor/control buildings, 1 control building, and 4 horizontal tanks (not measured) 1 Probable hydrotreating section with 3 columns, 1 process building, 1 pump building, 2 furnaces and 2 support buildings 1 Probable treating unit with 3 columns and 1 building 1 Possible fractionating unit with 1 column, 1 bank of heat exchangers, 1 process building, 1 furnace and 1 structure/building with horizontal tank on roof (12 meters long) 5 Miscellaneous support buildings |

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Table 2. Equipment and Facilities
at the Older Refinery at
Nadvornaya

| | | |
|----|--|------|
| 1 | Atmospheric fractionating column | |
| 2 | Probable stripping/stabilizing columns | |
| 3 | Probable treating/processing columns | |
| 1 | Pipe furnace | |
| 2 | Banks of heat exchangers | |
| 3 | Processing buildings | |
| 1 | Boilerhouse | |
| 1 | Air cooler | |
| 1 | Cascade-type cooling tower | |
| 36 | Administration, maintenance, storage, and support buildings | |
| 1 | Railcar loading rack | |
| 32 | Cylindrical storage tanks | |
| 2 | 18-meter-diameter | |
| 1 | 15-meter-diameter | |
| 5 | 12-meter-diameter | |
| 3 | [redacted] | 25X1 |
| 10 | 9-meter-diameter | |
| 1 | [redacted] | 25X1 |
| 1 | 6-meter-diameter | |
| 3 | [redacted] | 25X1 |
| 6 | 5-meter-diameter | |
| 19 | Horizontal storage tanks | |
| 1 | 21-meter-long | |
| 5 | [redacted] | 25X1 |
| 9 | [redacted] | |
| 1 | 9-meter-long | |
| 3 | 6-meter-long | |
| 3 | Water storage basins | |

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Map

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Requirement

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